

APT Center—Current Initiatives

- Clinical needs assessment
- Novel technologies to accelerate wound healing
- Subcutaneous myoelectric signal (EMG) telemeter for prosthetic control
- Switchable polymer materials that match their properties to the body
- MEMS based implantable pressure sensors
- Integrated control and sensory feedback for powered limb prostheses
- Networked neural prostheses

For more information on our current initiatives or to discuss a potential project for your center, please contact:

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APT Center
VA Research Center of
Excellence

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Mission: *The APT Center will develop advanced technologies that serve the clinical needs of veterans with motor and sensory deficits and limb loss to provide clinician-researchers within the VA with new tools for rehabilitation, treatment and scientific inquiry that lead to independence and enhanced societal participation. We will accomplish this by collaborating with leading academic, industrial and clinical partners within and outside the VA system.*

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APT Center Overview

The APT Center is a VA Research Center of Excellence established January 2005 in partnership with Case Western Reserve University. Clinicians, investigators, and staff work together to bring the clinical needs of veterans to the attention of the engineers and scientists pursuing new and emerging technologies in order to apply them for the purposes of reducing disability, improving daily functions, and enhancing quality of life. We are a technical center that designs and builds prototype devices that are clinically meaningful.

We support rehabilitation research by adapting cross-cutting foundational technical platforms to meet specific needs for advanced prosthetic systems, sensory aids, and other clinical applications.

Most grant-supported research concentrates on system development, pre-clinical testing, and clinical studies. The APT Center focuses on other aspects of the product development cycle, specifically 1) the identification of user needs, 2) the generation of new concepts (innovation), and 3) the development of new technologies through prototype and production stages. By shifting our focus, we are able to provide support to other Centers of Excellence when they need novel technologies or reach the point of technology transfer.

APT Center Capabilities

Microelectromechanical systems (MEMS) design and fabrication - Advanced micro-machining technologies offer the potential to design and produce mechanical or electronic devices on the same physical scale as the biological system.

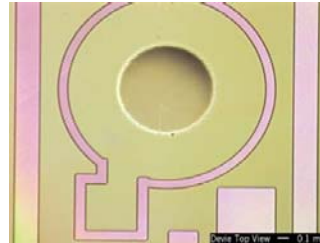


Figure 1. Example MEMS-based pressure sensor.

Neural interfacing - We have more than 40 combined years of experience with devices that bridge the gap between neurobiology and engineering. We have the facilities, tools, and know-how to help design, develop, and test systems that communicate with and transfer to and from the peripheral or central nervous systems.

Polymer and bioactive material development - New materials can be engineered on the molecular level to mimic biological functions or designed to interact and live with living tissue and biologic systems.

Rapid prototyping - Computer controlled machining, 3D printing, and other processes reduce design to fabrication time and insure quality and production volume.

System validation and design control - We design and produce devices according to industry standard design controls and FDA mandated good manufacturing practices.

Circuit and software design - Digital and analog simulation and other development tools are available for integrated circuit layout, fabrication, and testing, as well as creation and verification of new software systems.

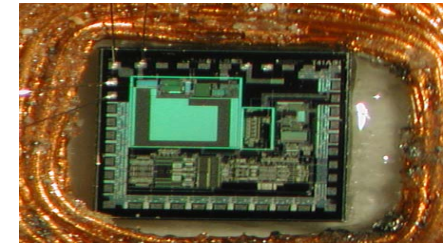


Figure 2. MEMS-based implanted physiological signal transceiver.

APT Center - Example Technologies

- EMG, EEG, ENG signal acquisition and processing
- Implantable sensing, recording, stimulating and communication devices
- Pressure, volume, acceleration, and other physical or chemical sensors
- Portable computer controlled systems for surface and percutaneous stimulation
- Stimulating and recording electrodes